promotes its passage into the aorta. Thus he considers inspiration as an auxiliary to the venous, and expiration to the arterial, circulation; the first acting like a sucking, and the latter like a forcing pump, in aiding the power of the heart. On this principle he explains the influence exerted on the circulation and on the action of the heart by various modes of respiration, whether voluntary or involuntary, in different circumstances. Laughter, crying, weeping, sobbing and sighing, &c., he considers as efforts made with a view to effect certain alterations in the quantity of blood in the lungs and heart, when the circulation has been disturbed by mental emotions.

"Experimental Researches in Electricity." Tenth Series. By Michael Faraday, Esq., F.R.S. D.C.L., &c. &c.

This paper relates altogether to the practical construction and use of the voltaic battery. Guided by the principles developed in former series, the author concluded that in voltaic instruments in which the copper surrounded the zinc, there was no occasion for insulation of the contiguous coppers, provided they did not come into metallic contact; and therefore in the construction of some new instruments he interposed paper only between the coppers instead of the usual insulating plate of porcelain or glass. The battery thus constructed is essentially the same with Dr. Hare's; and the author recommends even his form of trough for the purpose of putting the acid on to, and moving it from the plates. By attending to certain points described, as many as 40 pairs of plates could be packed into a space not more than 15 inches in length, and thus a very portable, and, at the same time, powerful and convenient trough might be obtained.

In comparing this form of trough with others, the author used acids of constant strength, took note of their quantity, allowed them to act in the troughs until the power of the apparatus had nearly ceased, estimated the quantity of effect by his volta-electrometer, and then estimated the quantity of zinc in the battery employed in producing the effect by the results of an analysis of a given portion of the exhausted charge. In this way it was easy to tell how much zinc was dissolved from any one plate, or from all the plates, and to compare it with the quantity of water decomposed in the volta-electrometer. Thus, with a perfect battery of 40 pairs of plates, an equivalent of water decomposed in the volta-electrometer would be the result of the solution of an equivalent of zinc from each zinc plate, or forty equivalents in the whole; but with a battery not so perfect, a greater proportion of zinc would be dissolved by the acid in the cells.

When the new battery was thus compared with that of the ordinary form, it was found to have greatly the advantage. Thus, with 40 pairs of plates, the former lost 2·21 equivalents at each plate, and the latter 3·54. With 20 pairs of plates, the former lost 3·7 per plate, and the latter 5·5. With 10 pairs of plates, the former lost 6·76 per plate, and the latter 15·5. The author refers to two difficulties still existing in the construction of the battery, but considers its value so great as to deserve receiving that degree of attention, by the application of which these difficulties may be removed.

The author then investigated many other practical points in the use of the battery, ascertaining the influence of various circumstances in the manner already described. Thus he found nitric acid to give a higher result of voltaic action than sulphuric or muriatic acid; the quantity of zinc dissolved in order to produce decomposition of an equivalent of water being only 1·85 per plate when nitric acid was used, 3·8 when muriatic acid was used, and 4·66 when sulphuric acid was employed. The acid which he afterwards used as the best for ordinary purposes consisted of 200 water, 4·5 oil of vitriol, and 4 nitric acid.

The mode of proof adopted by the author was of course independent of the strength of the acid; as was shown by making experiments with the same acid at very different strengths; thus, when nitric acid was used, and the strengths were as 1, 2, and 4, the proportion of zinc dissolved was very nearly the same for the water decomposed. The same result was obtained when sulphuric acid was employed.

The different circumstances of uniformity of charge—purity of zinc —foulness of the zinc plates—new and old plates—vicinity of the copper and zinc—doubling of the copper—first immersion of the plates—number of plates—size of the plates and simultaneous decompositions—were then considered, and such of them as would admit of experimental comparison in the manner already described were put to this test.

The Society then adjourned over the long vacation, to meet again on the 19th of November next.